



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/092,300	03/07/2002	Ho-Jin Kweon	1567.1027	2618

49455 7590 09/12/2005

STEIN, MCEWEN & BUI, LLP  
1400 EYE STREET, NW  
SUITE 300  
WASHINGTON, DC 20005

EXAMINER
----------

ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
----------	--------------

1745

DATE MAILED: 09/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/092,300

Applicant(s)

KWEON ET AL.

Examiner

Raymond Alejandro

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 August 2005.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,5,10,11,13,15-23,32,34,35,38 and 39 is/are pending in the application.  
4a) Of the above claim(s) 15-23,32,34 and 35 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1,2,5,10,11,13,38 and 39 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 07 March 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 08/12/05 has been entered.

This office paper is responsive to the amendment accompanying the foregoing RCE. The applicants have overcome the 35 USC 112 rejection. Refer to the abovementioned amendment for substance of applicant's rebuttal arguments. However, the present claims stand rejected as all the double patenting rejections and the 35 USC 103 rejection are herein maintained for the reasons of record. Moreover, additional art rejections are also presented infra. Thus, the instant application is again rejected as seen hereinbelow:

### ***Election/Restrictions***

1. This application contains claims 15-23, 32 and 34-35 drawn to an invention nonelected with traverse in Paper No. 12/05/03. A complete reply to this rejection must include cancellation of nonelected claims or other appropriate action.
2. Cancellation of claims 3, 6, 14, 24 and 33 is acknowledged.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

Art Unit: 1745

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-2, 5, 10-11 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Kweon et al 2002/0071990.

The applied reference has common inventors with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention “by another,” or by an appropriate showing under 37 CFR 1.131.

The present claims are drawn to a positive active material composition wherein the disclosed inventive concept comprises the specific additive compound.

As to claims 1 and 10:

Kweon et al disclose a positive active material for a rechargeable battery including a core and a surface treatment layer thereon (ABSTRACT/SECTION 0046); the core includes at least one lithiated compound and the surface treatment layer includes at least one coating material selected from the group consisting of coating element included-hydroxides, oxyhydroxides, oxycarbonates, hydrooxycarbonates and any mixture thereof (ABSTRACT/SECTION 0046). Kweon et al disclose that the coating material may have amorphous or crystalline form (SECTIONS 0046, 0128, 0153/ CLAIM 5); and amorphous Al-hydroxide (SECTION 0128, 0150, 0152).

Art Unit: 1745

In particular, Kweon et al disclose the use of coating element from the group of Mg, Al, Co, K, Na, Ca, Si, Ti, V, Sn, Ge, Ga, B, As, Zr (SECTION 0047/CLAIM 4). In addition to that, Kweon et al disclose the content of the coating element of the coating material is preferably 0.001 to 2 wt % (SECTION 0047, 0077).

On the matter of 2 and 11:

Kweon et al disclose the lithiated compound may be (SECTIONS 0049-0054):

[0049] The core includes at least one lithiated compound, and preferably includes at least one lithiated compound represented by the formulas 1 to 11,



[0050] where

[0051]  $0.95 \leq x \leq 1.10$  and  $0.50 \leq z \leq 0.50$  and  $0.50 \leq z \leq 2$ ,

[0052] M is Ni or Cu,

[0053] M' is at least one element selected from the group consisting of Al, Ni, Co, Cr, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr,

[0054] M' is at least one element selected from the group consisting of Al, Cr, Mn, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr.

In reference to claim 5 and 13:

As to the method limitation, i.e. *the additive compound being prepared by the specific drying and temperature treatment (heat treatment)*, it is noted that a method limitation incorporated into a product claim does not patentably distinguish the product because what is given patentably consideration is the product itself and not the manner in which the product was made. Therefore, the patentability of a product is independent of how it was made.

Consequently, the claims are anticipated.

5. Claims 1-2, 5, 10-11 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Kweon et al 2003/0003352.

The applied reference has common inventors with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

The present claims are drawn to a positive active material composition wherein the disclosed inventive concept comprises the specific additive compound.

As to claims 1 and 10:

Kweon et al disclose a positive active material for a rechargeable battery including a positive active material layer and a surface treatment layer thereon (ABSTRACT/CLAIM 1); the core includes at least one lithiated compound and the surface treatment layer includes at least one coating material selected from the group consisting of coating element included-hydroxides, oxyhydroxides, oxycarbonates, hydrooxycarbonates and any mixture thereof (ABSTRACT/CLAIM 1). Kweon et al disclose that the coating material may have amorphous or crystalline form (SECTION 0037/CLAIM 8).

In particular, Kweon et al disclose the use of coating element from the group of Mg, Al, Co, K, Na, Ca, Si, Ti, V, Sn, Ge, Ga, B, As, Zr (CLAIM 3). In addition to that, Kweon et al disclose that the concentration of the coating element is at or between 0.1-20 wt% of the coating solution (SECTION 0035).

Art Unit: 1745

On the matter of 2 and 11:

Kweon et al disclose the lithiated compound may be (CLAIM 2):

2. The positive electrode according to claim 1, wherein said positive active material comprises a lithiated compound selected from the group consisting of compounds represented by the formulas 1 to 13:

$\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{A}_z$	(1)
$\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_{2-z}\text{X}_z$	(2)
$\text{Li}_x\text{Mn}_2\text{O}_{4-z}\text{X}_z$	(3)
$\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{A}_4$	(4)
$\text{Li}_x\text{Co}_{1-y}\text{M}_y\text{A}_z$	(5)
$\text{Li}_x\text{Co}_{1-y}\text{M}_y\text{O}_{2-z}\text{X}_z$	(6)
$\text{Li}_x\text{Ni}_{1-y}\text{M}_y\text{A}_z$	(7)
$\text{Li}_x\text{Ni}_{1-y}\text{M}_y\text{O}_{2-z}\text{X}_z$	(8)
$\text{Li}_x\text{Ni}_{1-y}\text{Co}_y\text{O}_{2-z}\text{X}_z$	(9)
$\text{Li}_x\text{Ni}_{1-y-z}\text{Co}_y\text{M}_z\text{A}_4$	(10)
$\text{Li}_x\text{Ni}_{1-y-z}\text{Co}_y\text{M}_z\text{O}_{2-z}\text{X}_z$	(11)
$\text{Li}_x\text{Ni}_{1-y-z}\text{Mn}_y\text{M}_z\text{A}_4$	(12)
$\text{Li}_x\text{Ni}_{1-y-z}\text{Mn}_y\text{M}_z\text{O}_{2-z}\text{X}_z$	(13)

wherein:

$$0.95 \leq x \leq 1.1; 0 \leq y \leq 0.5; 0 \leq z \leq 0.5; 0 \leq \alpha \leq 2;$$

M is one element selected from the group consisting of Al, Ni, Co, Mn, Cr, Fe, Mg, Sr, V, and rare earth elements,

A is selected from the group consisting of O, F, S, and P, and

X is selected from the group consisting of F, S, and P.

In reference to claim 5 and 13:

As to the method limitation, i.e. *the additive compound being prepared by the specific drying and temperature treatment (heat treatment)*, it is noted that a method limitation incorporated into a product claim does not patentably distinguish the product because what is given patentably consideration is the product itself and not the manner in which the product was made. Therefore, the patentability of a product is independent of how it was made.

Hence, the claims are anticipated.

Art Unit: 1745

6. Claims 1-2, 5, 10-11 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Kweon et al 6753111.

The applied reference has common inventors with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

The present claims are drawn to a positive active material composition wherein the disclosed inventive concept comprises the specific additive compound.

As to claims 1 and 10:

Kweon et al disclose a positive active material for a rechargeable battery including a positive active material comprising a core and a surface treatment layer thereon (ABSTRACT/CLAIM 1); the core includes at least one lithiated compound and the surface treatment layer includes at least one coating material selected from the group consisting of coating element included-hydroxides, oxyhydroxides, oxycarbonates, hydrooxycarbonates and any mixture thereof (ABSTRACT/CLAIM 1, 12, 15). Kweon et al disclose that the coating material have a crystalline form (COL 7, lines 21-35). Kweon et al disclose the specific coating material being Al-hydroxide (CLAIM 12).

In particular, Kweon et al disclose the use of coating element from the group of Mg, Al, Co, K, Na, Ca, Si, Ti, V, Ge, Ga, B, As, Zr (CLAIM 3). In addition to that, Kweon et al disclose



Art Unit: 1745

that the content of the coating element is 0.001-1 wt% based on the weight of the positive active material (CLAIM 5).

On the matter of 2 and 11:

Kweon et al disclose the lithiated compound may be (CLAIM 2):

2. The positive active material according to claim 1, wherein the lithiated compound is at least one compound selected from the group consisting of compounds represented by the formulas 1 to 11:



wherein:

$$0.95 \leq x \leq 1.1, 0 \leq y \leq 0.5, 0 \leq z \leq 0.5, 0 \leq \alpha \leq 2,$$

M is Ni or Co,

M' is at least one element selected from the group consisting of Al, Ni, Co, Cr, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, and Pa,

M'' is at least one element selected from the group consisting of Al, Cr, Mn, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, and Pa,

A is selected from the group consisting of O, P, S and P,

and

X is selected from the group consisting of F, S and P.

In reference to claim 5 and 13:

As to the method limitation, i.e. *the additive compound being prepared by the specific drying and temperature treatment (heat treatment)*, it is noted that a method limitation incorporated into a product claim does not patentably distinguish the product because what is given patentably consideration is the product itself and not the manner in which the product was made. Therefore, the patentability of a product is independent of how it was made.

As a result, the claims are anticipated.

Art Unit: 1745

7. Claims 1-2, 5, 10-11 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Kweon et al 6797435.

The applied reference has common inventors with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

The present claims are drawn to a positive active material composition wherein the disclosed inventive concept comprises the specific additive compound.

As to claims 1 and 10:

Kweon et al disclose a positive active material for a rechargeable battery including a positive active material comprising a core and a surface treatment layer thereon (ABSTRACT/CLAIM 1); the core includes at least one lithiated compound and the surface treatment layer includes at least one coating material selected from the group consisting of coating element included-hydroxides, oxyhydroxides, oxycarbonates, hydrooxycarbonates and any mixture thereof (ABSTRACT/CLAIM 1). Kweon et al disclose that the coating material may have an amorphous or crystalline form (COL 7, lines 13-18).

In particular, Kweon et al disclose the use of coating element from the group of Mg, Al, Co, K, Na, Ca, Si, Ti, V, Ge, Ga, B, As, Zr (ABSTRACT/CLAIM 1). In addition to that, Kweon et al disclose that the content of the coating element is 0.1-5 wt% based on the weight of the positive active material (COL 5, lines 50-59).

Art Unit: 1745

On the matter of 2 and 11:

Kweon et al disclose the lithiated compound may be (CLAIM 2):

2. The positive active material according to claim 1, wherein

the lithiated compound is selected from the group consisting of compounds represented by the formulas 1 to 13.

$L_xMn_{1-y}M_zA_z$	(1)
$L_xMn_{1-y}M_zO_{2-z}X_z$	(2)
$L_xMn_2O_4X_z$	(3)
$L_xMn_{2-2y}M_zA_z$	(4)
$L_xCo_{1-y}M_zA_z$	(5)
$L_xCo_{1-y}M_zO_{2-z}X_z$	(6)
$L_xNi_{1-y}M_zA_z$	(7)
$L_xNi_{1-y}M_zO_{2-z}X_z$	(8)
$L_xNi_{1-y}Co_zO_{2-z}X_z$	(9)
$L_xNi_{1-y-z}Co_zM_zA_z$	(10)
$L_xNi_{1-y-z}Co_zM_zO_{2-z}X_z$	(11)
$L_xNi_{1-y-z}Mn_zM_zA_z$	(12)
$L_xNi_{1-y-z}Mn_zM_zO_{2-z}X_z$	(13)

$0.95 \leq x \leq 1.1$ ,  $0 \leq y \leq 0.5$ ,  $0 \leq z \leq 0.5$ ,  $0 \leq a \leq 2$ .

M is one selected from the group consisting of Al, Ni, Co, Mn, Cr, Fe, Mg, Sr, V, or rare earth elements,

A is selected from the group consisting of O, F, S and P, and

X is selected from the group consisting of F, S and P.

In reference to claim 5 and 13:

As to the method limitation, i.e. *the additive compound being prepared by the specific drying and temperature treatment (heat treatment)*, it is noted that a method limitation incorporated into a product claim does not patentably distinguish the product because what is given patentably consideration is the product itself and not the manner in which the product was made. Therefore, the patentability of a product is independent of how it was made.

For this reason, the claims are anticipated.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-2, 5, 10-11 and 13 and 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amatucci et al 5705291 in view of the Japanese publication JP 09-171813 (hereinafter referred to as "*the JP'813 publication*").

The present claims are drawn to a positive active material composition wherein the disclosed inventive concept comprises the specific additive compound.

In reference to claims 1 and 10:

Amatucci et al disclose a positive electrode comprising a lithiated composition particulate comprising the positive electrode which have been coated with a passivating layer of a composition comprising a borate, lithiated borate, aluminate, lithiated aluminate, silicate, lithiated silicate or mixture thereof (ABSTRACT). It is also disclosed that the lithiated

Art Unit: 1745

intercalation compound is coated with coating compositions comprising boron oxide, boric acid, lithium hydroxide, aluminum oxide, lithium aluminate, lithium metaborate, silicon dioxide, lithium silicate or mixtures thereof (CLAIMS 1 and 6/ COL 2, lines 5-25). *It is noted that such coating compositions represent additive compounds, that is, compounds added to, included to or incorporated into the positive active material.*

It is disclosed that such additive compound can be added in an amount ranging from 0.4 to 1.0 % by weight (EXAMPLES 1-3). In particular, **EXAMPLE 3** shows the addition of 0.4 % of the borate powder (EXAMPLE 3) (*←emphasis added*).

6. A rechargeable battery cell comprising a negative  
25 electrode, a positive electrode, and an intermediate nonaque-  
ous electrolyte characterized in that said positive electrode  
comprises a particulate lithium intercalation compound the  
particles of which are coated with a passivating layer  
comprising an annealed coating composition comprising  
30 boron oxide, boric acid, lithium hydroxide, aluminum oxide,  
lithium aluminate, lithium metaborate, silicon dioxide,  
lithium silicate, or mixtures thereof.

5 These objects, among others, have been achieved in the  
present invention by means of a novel lithium intercalation  
cell in which the surfaces of aggregate lithiated intercalation  
composition particulates comprising the positive cell elec-  
trode have been passivated by coating or encapsulation in a  
10 layer of a composition comprising a borate, lithiated borate,  
aluminate, lithiated aluminate, silicate, or lithiated silicate.  
Such a coating not only reduces the surface area, and thus  
the degree of activity, of the potentially catalytic particulate  
aggregates, but also provides a barrier layer which, while  
15 limiting contact between the electrolyte and the positive  
electrode particulates, does not seriously deter the passage of  
Li<sup>+</sup> ions.

20 In a preferred embodiment of the present invention, the  
surfaces of these particulates are coated with a layer of a  
composition comprising boron oxide, boric acid, lithium  
hydroxide, aluminum oxide, lithium aluminate, lithium  
metaborate, silicon dioxide, lithium silicate, or mixtures  
thereof. In another embodiment of the present invention, the

It is disclosed that the coating composition has either a glassy or crystalline form (COL 4, lines 13-17); in particular, the borate is amorphous (EXAMPLE 1).

In reference to claims 2 and 11:

Amatucci et al teach the use of LiCoO<sub>2</sub>, LiNiO<sub>2</sub> and Li<sub>1+x</sub>Mn<sub>2</sub>O<sub>4</sub> (COL 1, line 38-42).

**EXAMPLES 1-3** illustrates the specific use of LiMn<sub>2</sub>O<sub>4</sub> (EXAMPLES 1-3).

Art Unit: 1745

In reference to claim and 10:

Amatucci et al shows with *sufficient specificity* the use of  $H_3BO_3$  and/or  $B_2O_3$  compounds among others. Amatucci et al also disclose the use of composition comprising a borate, lithiated borate, aluminate, lithiated aluminate, silicate, lithiated silicate or mixture thereof

(ABSTRACT). It is also disclosed that the lithiated intercalation compound is coated with coating compositions comprising boron oxide, boric acid, lithium hydroxide, aluminum oxide, lithium aluminate, lithium metaborate, silicon dioxide, lithium silicate or mixtures thereof (CLAIMS 1 and 6/ COL 2, lines 5-25).

In this respect, it is noted that EXAMPLE 3 shows the use of  $B_2O_3$  and  $LiOH \cdot H_2O$  to obtain a fine lithiated powder (EXAMPLE 3 or COL 5, lines 25-45). Thus, it is contended that a secondary product of such mixture combination of  $B_2O_3$  and  $LiOH \cdot H_2O$  can be a hydroxide of boron.

In reference to claims 5 and 13:

As to the method limitation, i.e. *the additive compound being prepared by the specific drying and temperature treatment (heat treatment)*, it is noted that a method limitation incorporated into a product claim does not patentably distinguish the product because what is given patentably consideration is the product itself and not the manner in which the product was made. Therefore, the patentability of a product is independent of how it was made.

Moreover, Amatucci et al disclose the process of annealing the material at a temperature in the excess of about 400 °C, preferably in the range of about 500-800 °C (COL 2, lines 19-29). Hence, it is contended that at these temperatures, the drying of liquid necessarily occurs unless

Art Unit: 1745

*the liquid has an evaporation point higher than 800 °C. Nevertheless, the claim language is silent as to the specific chemical composition of the liquid subjected to the drying step.*

As to claim 38:

It is disclosed that positive electrode composition is associated with a current collector member all together (COL 2, lines 60-67).

Amatucci et al'291 disclose a coated positive electrode according to the foregoing aspects. However, the preceding prior art fails to expressly disclose the specific thermal absorbent material; the additive compound not including lithium and not coating with the additive compound.

With respect to claims 1, 3, 10 and 36-37:

The JP'813 publication discloses a positive electrode active material including an inorganic material (ABSTRACT). In particular, the JP'813 publication discloses an active material comprising a lithiated compound and aluminum hydroxide (SECTION 0019-0021). *It is noted that aluminum hydroxide is a thermal absorbent element.*

As to claims 2, 11:

The JP'813 publication teaches the use of lithium multiple oxides such as  $\text{LiCoO}_2$ ,  $\text{LiNiO}_2$ ,  $\text{Li}_x\text{Ni}_y\text{Co}_{1-y}\text{O}_2$  and  $\text{LiMn}_2\text{O}_4$  (SECTION 0024).

Concerning claims 38-39:

The JP'813 publication teaches the mixing of the lithiated compound and the aluminum hydroxide upon formation thereof and having deposited the composite material on the electrode support (SECTION 0020) including forming a composite slurry which is applied to a foil (SECTIONS 0035-0038).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the specific additive compound not including lithium and not coating with the additive compound of the JP'813 publication in the positive active material of Amatucci et al as the JP'813 publication teaches that such additive compound provides a positive active material network structure with improved load and capacity characteristics; and excellent charging/discharging cycle-ability.

### ***Double Patenting***

11. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

12. Claims 1-2, 5, 10-11 and 13 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3, 11 and 15 of U.S.



Art Unit: 1745

Patent No. 6797435 in view of Amatucci et al 5705291. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

The '435 patent claims the following (CLAIMS 1-3, 11 and 15):

1. A positive active material for a rechargeable lithium battery comprising:  
 a core comprising a lithiated compound; and  
 at least two surface-treatment layers formed on said core,  
 each of said surface-treatment layers comprising at  
 least one compound selected from the group consisting  
 of a coating-element-included hydroxide, a coating-  
 element-included oxyhydroxide, a coating-element-  
 included oxycarbonate, and a coating-element-included  
 hydroxycarbonate,  
 wherein the coating element is selected from the group  
 consisting of Al, Si, Ti, Sn, V, Ge, Ga, B, and As.  
 2. The positive active material according to claim 1,  
 wherein:  
 the lithiated compound is selected from the group con-  
 sisting of compounds represented by the formulas 1 to  
 13:

$\text{Li}_x\text{Mn}_{1-x}\text{M}_2\text{A}_y$	(1)
$\text{Li}_x\text{Mn}_{1-x}\text{M}_2\text{O}_{2-x}\text{X}_x$	(2)
$\text{Li}_x\text{Mn}_{1-x}\text{O}_{2-x}\text{X}_x$	(3)
$\text{Li}_x\text{Mn}_{1-x}\text{M}_2\text{A}_y$	(4)
$\text{Li}_x\text{Co}_{1-x}\text{M}_2\text{A}_y$	(5)
$\text{Li}_x\text{Co}_{1-x}\text{M}_2\text{O}_{2-x}\text{X}_x$	(6)
$\text{Li}_x\text{Ni}_{1-x}\text{M}_2\text{A}_y$	(7)
$\text{Li}_x\text{Ni}_{1-x}\text{M}_2\text{O}_{2-x}\text{X}_x$	(8)
$\text{Li}_x\text{Ni}_{1-x}\text{Co}_y\text{O}_{2-x}\text{X}_x$	(9)
$\text{Li}_x\text{Ni}_{1-x}\text{Co}_y\text{M}_2\text{A}_y$	(10)
$\text{Li}_x\text{Ni}_{1-x}\text{Co}_y\text{M}_2\text{O}_{2-x}\text{X}_x$	(11)
$\text{Li}_x\text{Ni}_{1-x}\text{M}_2\text{A}_y$	(12)
$\text{Li}_x\text{Ni}_{1-x}\text{M}_2\text{O}_{2-x}\text{X}_x$	(13)

0.95  $\leq x \leq 1.1$ , 0  $\leq y \leq 0.5$ , 0  $\leq z \leq 0.5$ , 0  $\leq \alpha \leq 2$ ,  
 M is one selected from the group consisting of Al, Ni, Co,  
 Mn, Cr, Fe, Mg, Sr, V, or rare earth elements,  
 A is selected from the group consisting of O, F, S and P,  
 and  
 X is selected from the group consisting of F, S and P.  
 3. The positive active material according to claim 1,  
 wherein said at least two surface-treatment layers comprise  
 at least two coating elements selected from the group  
 consisting of Al, Si, Ti, Sn, V, Ge, Ga, B, and As.

11. A positive active material for a rechargeable lithium battery comprising:  
 a core comprising a lithiated compound;  
 a first surface-treatment layer formed on said core, said  
 first surface-treatment layer comprising at least one  
 compound selected from the group consisting of an  
 Al-included hydroxide, an Al-included oxyhydroxide,  
 an Al-included oxycarbonate, and an Al-included  
 hydroxycarbonate; and  
 a second surface-treatment layer formed on said first  
 surface-treatment layer, said second surface-treatment

Art Unit: 1745

**14**

layer comprising at least one compound selected from the group consisting of an Si-included hydroxide, an Si-included oxyhydroxide, an Si-included oxycarbonate, and an Si-included hydroxycarbonate.

15. A positive active material for a rechargeable lithium battery, comprising:

- a core comprising a lithium-cobalt based compound;
- a first surface-treatment layer formed on said core, said first surface-treatment layer comprising at least one compound selected from the group consisting of an Si-included hydroxide, an Si-included oxyhydroxide, an Si-included oxycarbonate, and an Si-included hydroxycarbonate; and
- a second surface-treatment layer formed on said first surface-treatment layer, said second surface-treatment layer comprising at least one compound selected from the group consisting of an Al-included hydroxide, an Al-included oxyhydroxide, an Al-included oxycarbonate, and an Al-included hydroxycarbonate.

In this case, the application claims are broader or more generic than the patent claims, thus, the application claims are anticipated by the patent claims. Accordingly, a broad limitation/range is anticipated by a narrow limitation/range which lies within the broad limitation. *In re Goodman*.

The '435 patent claims a positive active material as described above. However, the '435 patent does not expressly claim the specific weight percent of the additive compound.

Amatucci et al disclose a positive electrode comprising a lithiated composition particulate comprising the positive electrode which have been coated with a passivating layer of a composition comprising an additive compound including a hydroxide (CLAIMS 1 and 6/ COL 2, lines 5-25). *It is noted that such coating compositions represent additive compounds, that is, compounds added to, included to or incorporated into the positive active material.* It is disclosed that such additive compound can be added in an amount ranging from 0.4 to 1.0 % by weight

Art Unit: 1745

(EXAMPLES 1-3). In particular, **EXAMPLE 3** shows the addition of 0.4 % of the borate powder (EXAMPLE 3) (*←emphasis added*).

In spite of these disclosures, it would have been obvious to one skilled in the art at the time the invention was made to use the specific weight percent of the additive compound of Amatucci et al in the positive active material of the '435 patent as the Amatucci et al disclose that positive active materials having such additive weight percent exhibit improved cycle capacity and electrochemical performance. *Furthermore, Amatucci et al directly teach the use of additive compound within the claimed range; and with sufficient specificity.*

13. Claims 1-2, 5, 10-11 and 13 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-5 and 12-17 of U.S. Patent No. 6753111. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

The '111 patent claims the following (CLAIMS 1-5 and 12-17):

1. A positive active material for a rechargeable lithium battery comprising:  
a core comprising a lithiated compound, the lithiated compound comprising a secondary particle having an average size larger than or equal to 1  $\mu\text{m}$  and smaller than 10  $\mu\text{m}$  in diameter, the secondary particle being formed of an agglomeration of small primary particles of an average size of 1 to 3  $\mu\text{m}$  in diameter; and  
a surface-treatment layer on the core, the surface-treatment layer comprising a coating-element-included oxide or a coating-element-included hydroxide, oxyhydroxide, oxycarbonate, hydroxycarbonate or a mixture thereof.

Art Unit: 1745

2. The positive active material according to claim 1, wherein the lithiated compound is at least one compound selected from the group consisting of compounds represented by the formulas 1 to 11:



wherein:

$$0.95 \leq x \leq 1.1, 0 \leq y \leq 0.5, 0 \leq z \leq 0.5, 0 \leq w \leq 2, \quad (4)$$

M is Ni or Co,

M' is at least one element selected from the group consisting of Al, Ni, Co, Cr, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, and Pa,

M'' is at least one element selected from the group consisting of Al, Cr, Mn, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, and Pa,

A is selected from the group consisting of O, F, S and P, and

X is selected from the group consisting of F, S and P.

3. The positive active material according to claim 1, wherein the coating element is selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, V, Ge, Ga, B, As, and Zr.

4. The positive active material according to claim 1, wherein the content of the coating element of the surface-treatment layer is  $2 \times 10^{-2}$  to 1 wt % based on the weight of the positive active material.

5. The positive active material according to claim 4, wherein the content of the coating element of the surface-treatment layer is 0.001 to 1 wt % based on the weight of the positive active material.

In this case, the application claims are broader or more generic than the patent claims, thus, the application claims are anticipated by the patent claims. Accordingly, a broad limitation/range is anticipated by a narrow limitation/range which lies within the broad limitation. *In re Goodman*. It is also noted that the specific weight percent of the additive

Art Unit: 1745

*compound is an obvious variation of the claimed invention in the '111 patent claims as claims 4-5 thereof specifically claims the particular weight percent.*

14. Claims 1-2, 5, 10-11 and 13 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-15, 28-30, 32-35 of copending Application No. 10/189384 (*US Patent Application Publication 2003/0054250*). Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

The copending application'384 claims the following (claims 1-15, 28-30, 32-35):

1. An active material for a battery, comprising:
  - a material that undergoes reversible electrochemical oxidation-reduction reactions and having a surface,
  - a surface treatment layer on the surface and comprising a conductive agent and at least one coating-element-containing compound selected from the group consisting of a coating-element-containing hydroxide, a coating-element-containing oxyhydroxide, a coating-element-containing oxycarbonate, a coating-element-containing hydroxycarbonate, and a mixture thereof.
2. The active material of claim 1, wherein said material is selected from the group consisting of a metal, a lithium-containing alloy, a compound that reversibly forms a lithium-containing compound by a reaction with lithium ions, a material that reversibly intercalates/deintercalates lithium ions and a lithiated intercalation compound.
3. The active material of claim 2, wherein said material comprises the lithiated intercalation compound that is selected from the group consisting of a lithium-containing metal oxide, a lithium-containing chalcogenide compound, and a carbon-based material.
4. The active material of claim 2, wherein said material comprises the lithiated intercalation compound that is at least one selected from the group consisting of a lithium compound with the following formulas (1) to (13):
 

$\text{Li}_x\text{Mn}_{1-x}\text{M}_2\text{O}_2$	(1)
$\text{Li}_x\text{Mn}_{1-x}\text{M}_2\text{O}_{2-x}\text{N}_x$	(2)
$\text{Li}_x\text{Mn}_{1-x}\text{M}_2\text{O}_{2-x}\text{N}_x$	(3)
$\text{Li}_x\text{Mn}_{1-x}\text{M}_2\text{O}_2$	(4)
$\text{Li}_x\text{Co}_{1-x}\text{M}_2\text{O}_2$	(5)
$\text{Li}_x\text{Co}_{1-x}\text{M}_2\text{O}_{2-x}\text{N}_x$	(6)
$\text{Li}_x\text{Ni}_{1-x}\text{M}_2\text{O}_2$	(7)
$\text{Li}_x\text{Ni}_{1-x}\text{M}_2\text{O}_{2-x}\text{N}_x$	(8)
$\text{Li}_x\text{Ni}_{1-x}\text{Co}_x\text{O}_{2-x}\text{N}_x$	(9)

-continued-

$\text{Li}_x\text{Ni}_{1-x-y}\text{Co}_y\text{M}_z\text{O}_2$	(10)
$\text{Li}_x\text{Ni}_{1-x-y}\text{Co}_y\text{M}_z\text{O}_{2-z}\text{X}_z$	(11)
$\text{Li}_x\text{Ni}_{1-x-y}\text{M}_y\text{M}_z\text{A}_w$	(12)
$\text{Li}_x\text{Ni}_{1-x-y}\text{M}_y\text{M}_z\text{O}_{2-z}\text{X}_z$	(13)

wherein

$$0.95 \leq x < 1.1; 0 \leq y \leq 0.5; 0 \leq z \leq 0.5; 0 \leq w \leq 2;$$

M is at least one element selected from the group consisting of Al, Ni, Co, Mn, Cr, Fe, Mg, Sr, V, and rare earth elements;

A is at least one element selected from the group consisting of O, F, S, and P; and

X is at least one element selected from the group consisting of P, S, and P.

5. The active material of claim 1, wherein the coating element is soluble in an organic solvent or water.

6. The active material of claim 5, wherein the coating element is at least one selected from the group consisting of an alkali metal, an alkaline earth metal, a group 13 element of the Periodic Table, a group 14 element of the Periodic Table, a group 15 element of the Periodic Table, and a transition metal.

7. The active material of claim 6, wherein the coating element is at least one selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, B, As, Zr, Sn, V, Ge, Ga, and a combination thereof.

8. The active material of claim 1, wherein the coating-element-containing compound has either an amorphous or a crystalline phase.

9. The active material of claim 1, wherein a thickness of said surface-treatment layer is 1 to 300 nm.

10. The active material of claim 9, wherein a thickness of said surface-treatment layer is 1 to 100 nm.

11. The active material of claim 1, wherein an amount of the coating element is  $2 \times 10^{-5}$  to 2% by weight of the active material.

12. The active material of claim 11, wherein the amount of the coating element is 0.001 to 2% by weight of the active material.

13. The active material of claim 1, wherein the conductive agent is at least one material selected from the group consisting of a carbon-based conductive agent, a graphite-based conductive agent, a metal-based conductive agent, and a metallic-compound-based conductive agent.

14. The active material of claim 1, wherein an amount of the conductive agent is 0.5 to 10% by weight of the active material.

15. The active material of claim 14, wherein the amount of the conductive agent is 1 to 5% by weight of the active material.

Art Unit: 1745

**28. An active material for a battery comprising:**

a material that has a surface and that undergoes reversible electrochemical oxidation-reduction reactions; and

a surface treatment layer on the surface, the layer comprising a conductive agent and an Al-containing compound selected from the group consisting of an Al-containing hydroxide, an Al-containing oxyhydroxide, an Al-containing oxycarbonate, an Al-containing hydroxycarbonate, and a mixture thereof.

**29. An active material for a battery comprising:**

a material that has a surface and that undergoes reversible electrochemical oxidation-reduction reactions; and

a surface treatment layer on the surface, the layer comprising a conductive agent and a B-containing compound selected from the group consisting of a B-containing hydroxide, a B-containing oxyhydroxide, a B-containing oxycarbonate, a B-containing hydroxycarbonate, and a mixture thereof.

**30. An active material for a battery, comprising:**

a material that has a surface and that undergoes reversible electrochemical oxidation-reduction reactions; and

a surface treatment layer coated on the surface, wherein said coated material is prepared by a method comprising:

adding a conductive agent and a coating-element source to a solvent selected from the group consisting of water, organic solvent, and a mixture thereof to prepare a coating liquid;

adding said material to the coating liquid to coat said material; and

drying the coated material to form the surface-treatment layer comprising the conductive agent and at least one coating-element-containing compound selected from the group consisting of a coating-element-containing hydroxide, a coating-element-containing oxyhydroxide, a coating-element-containing oxycarbonate, a coating-element-containing hydroxycarbonate, and a mixture thereof.

**32. An electrode for use in a battery, comprising:**

a current collector; and

an active material coated with a layer, the layer comprising a conductive agent and at least one compound selected from the group consisting of a coating-element-containing hydroxide, a coating-element-containing oxyhydroxide, a coating-element-containing oxycarbonate, a coating-element-containing hydroxycarbonate, and a mixture thereof;

wherein said active material is coated on said current collector.

**33. A battery comprising:**

a first electrode comprising a current collector and a coated active material, the coated active material comprising a layer including a conductive agent and at least one compound selected from the group consisting of a coating-element-containing hydroxide, a coating-element-containing oxyhydroxide, a coating-element-containing oxycarbonate, a coating-element-containing hydroxycarbonate, and a mixture thereof;

an electrolyte; and

a counter electrode spaced apart from said first electrode to perform reversible oxidation-reduction reactions with said first electrode through said electrolyte.

**34. The active material of claim 1, wherein an average particle size of said material is 1 to 50  $\mu\text{m}$ .**

**35. The active material of claim 34, wherein the average particle size is 5 to 20  $\mu\text{m}$ .**

Art Unit: 1745

In this case, the application claims are broader or more generic than the copending application'384 claims, thus, the application claims are anticipated by the copending application'384claims. Accordingly, a broad limitation/range is anticipated by a narrow limitation/range which lies within the broad limitation. *In re Goodman*. It is also noted that the specific weight percent of the additive compound is an obvious variation of the claimed invention in the copending application'384 as claims 11-12 and 14-15 thereof specifically claims the particular weight percent.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

15. Claims 1-2, 5, 10-11 and 13 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-5 and 23-28 of copending Application No. 10/072923. (*US Patent Application Publication 2003/0003352*) in view of Amatucci et al 5705291. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

The copending application'923 claims the following (CLAIMS 1-5 and 23-28):

1. A positive electrode for a rechargeable lithium battery, comprising:

a current collector;

a positive active material layer coated on said current collector, said positive active material layer comprising a positive active material; and

a surface-treatment layer on said positive active material layer, said surface treatment layer comprising a compound selected from the group consisting of a coating-element-included hydroxide, a coating-element-included oxyhydroxide, a coating-element-included oxycarbonate, a coating-element-included hydroxycarbonate, and a mixture thereof.

2. The positive electrode according to claim 1, wherein said positive active material comprises a lithiated compound selected from the group consisting of compounds represented by the formulas 1 to 13:



Art Unit: 1745

$\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{A}_z$	(1)
$\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_{2-z}\text{X}_z$	(2)
$\text{Li}_x\text{Mn}_y\text{O}_{2-z}\text{X}_z$	(3)
$\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{A}_z$	(4)
$\text{Li}_x\text{Co}_{1-y}\text{M}_y\text{A}_z$	(5)
$\text{Li}_x\text{Co}_{1-y}\text{M}_y\text{O}_{2-z}\text{X}_z$	(6)
$\text{Li}_x\text{Ni}_{1-y}\text{M}_y\text{A}_z$	(7)
$\text{Li}_x\text{Ni}_{1-y}\text{M}_y\text{O}_{2-z}\text{X}_z$	(8)
$\text{Li}_x\text{Ni}_{1-y}\text{Co}_y\text{O}_{2-z}\text{X}_z$	(9)
$\text{Li}_x\text{Ni}_{1-y}\text{Co}_y\text{M}_z\text{A}_z$	(10)
$\text{Li}_x\text{Ni}_{1-y}\text{Co}_y\text{M}_z\text{O}_{2-z}\text{X}_z$	(11)
$\text{Li}_x\text{Ni}_{1-y}\text{M}_y\text{M}_z\text{A}_z$	(12)
$\text{Li}_x\text{Ni}_{1-y}\text{M}_y\text{M}_z\text{O}_{2-z}\text{X}_z$	(13)

wherein:

$$0.95 \leq x \leq 1.1; 0 \leq y \leq 0.5; 0 \leq z \leq 0.5; 0 \leq \alpha \leq 2.$$

M is one element selected from the group consisting of Al, Ni, Co, Mn, Cr, Fe, Mg, Sr, V, and rare earth elements,

A is selected from the group consisting of O, F, S, and P, and

X is selected from the group consisting of F, S, and P.

3. The positive electrode according to claim 1, wherein said surface-treatment layer comprises a coating-element selected from the group consisting of Mg, Al, Cu, Ir, Na, Ca, Si, Ti, Sn, V, Ge, Ga, B, As, and Zn.

4. The positive electrode according to claim 1, wherein said surface-treatment layer is formed by coating the positive active material layer with a coating liquid.

5. The positive electrode according to claim 4, wherein the coating process includes one of a dipping method and a vacuum impregnation method.

23. A positive electrode for a rechargeable lithium battery, comprising:

a current collector;

a positive active material layer coated on said current collector, said positive active material layer comprising a positive active material selected from the group consisting of lithium-cobalt chalcogenide, lithium-manganese chalcogenide, lithium-nickel chalcogenide and lithium-nickel-manganese chalcogenide; and

a surface-treatment layer on said positive active material layer, said surface treatment layer comprising a com-

pound selected from the group consisting of a coating-element-included hydroxide, a coating-element-included oxyhydroxide, a coating-element-included oxycarbonate, a coating-element-included hydroxycarbonate, and a mixture thereof,

wherein the coating-element is one of Al and B.

24. A positive electrode for a rechargeable lithium battery, comprising:

a current collector;

a positive active material layer coated on said current collector, said positive active material layer comprising a  $\text{LiCoO}_2$  positive active material; and

a surface-treatment layer disposed on said positive active material layer, said surface treatment layer comprising a compound selected from the group consisting of a coating-element-included hydroxide, a coating-element-included oxyhydroxide, a coating-element-included oxycarbonate, a coating-element-included hydroxycarbonate, and a mixture thereof,

wherein the coating-element is one of Al and B.

Art Unit: 1745

25. A lithium battery comprising:

- a first electrode comprising a layer of a lithiated compound coated with a surface treatment layer, the surface treatment layer comprising one of a coating-element-included hydroxide, a coating-element-included oxyhydroxide, a coating-element-included oxycarbonate, a coating-element-included hydroxycarbonate, and a mixture thereof;
- a second electrode comprising a material to reversibly intercalate lithium ions; and
- a separator and an electrolyte disposed between said first and second electrodes.

26. The lithium battery of claim 25, wherein the coating element comprises one of Mg, Al, Co, K, Na, Ca, Si, Ti, V, Sn, Ge, B, As, and Zr.

27. The lithium battery of claim 25, wherein the surface treatment layer has a thickness of at or between 1 and 100 nm.

28. The lithium battery of claim 25, wherein said first electrode is prepared in accordance with a method comprising:

- treating a current collector, which is coated with a layer of a positive active material, with a coating liquid, the coating liquid comprising one of a coating element and a coating-element-included compound; and
- drying the treated current collector to form the surface treatment layer comprising one of the coating-element-included hydroxide, the coating-element-included oxyhydroxide, the coating-element-included oxycarbonate, the coating-element-included hydroxycarbonate, and a mixture thereof.

In this case, the application claims are broader or more generic than the copending application'923 claims, thus, the application claims are anticipated by the copending application'923 claims. Accordingly, a broad limitation/range is anticipated by a narrow limitation/range which lies within the broad limitation. *In re Goodman*.

The copending application'923 claims a positive active material as described above. However, the copending application'923 does not expressly claim the specific weight percent of the additive compound.

Amatucci et al disclose a positive electrode comprising a lithiated composition particulate comprising the positive electrode which have been coated with a passivating layer of a composition comprising an additive compound including a hydroxide (CLAIMS 1 and 6/ COL 2, lines 5-25). *It is noted that such coating compositions represent additive compounds, that is,*

Art Unit: 1745

*compounds added to, included to or incorporated into the positive active material.* It is disclosed that such additive compound can be added in an amount ranging from 0.4 to 1.0 % by weight (EXAMPLES 1-3). In particular, **EXAMPLE 3** shows the addition of 0.4 % of the borate powder (EXAMPLE 3) (*←emphasis added*).

In spite of these disclosures, it would have been obvious to one skilled in the art at the time the invention was made to use the specific weight percent of the additive compound of Amatucci et al in the positive active material of the copending application '923 as the Amatucci et al disclose that positive active materials having such additive weight percent exhibit improved cycle capacity and electrochemical performance. *Furthermore, Amatucci et al directly teach the use of additive compound within the claimed range; and with sufficient specificity.*

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

16. Claims 1-2, 5, 10-11 and 13 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 25-37 of copending Application No. 09/897445 (*US Patent Application Publication 2002/0071990*). Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

The copending application '445 claims the following (CLAIMS 1-10 and 25-37):

1. A positive active material for a rechargeable lithium battery comprising:  
a core comprising at least one lithiated compound; and  
a surface treatment layer on the core comprising at least one coating material selected from the group consisting of coating elements included hydroxides, oxyhydroxides, oxycarbonates, hydroxycarbonates and a mixture thereof.  
2. The positive active material of claim 1 wherein the lithiated compound is at least one lithiated compound represented by the formulas 1 to

Art Unit: 1745

- $\text{Li}_x\text{Mn}_{1-y}\text{M}'_y\text{A}_z$  (1)
- $\text{Li}_x\text{Mn}_{1-y}\text{M}'_y\text{O}_{2-z}\text{A}_z$  (2)
- $\text{Li}_x\text{Mn}_2\text{O}_{4-z}\text{A}_z$  (3)
- $\text{Li}_x\text{Mn}_{1-y}\text{M}'_y\text{X}_z$  (4)
- $\text{Li}_x\text{M}_{1-y}\text{M}'_y\text{A}_z$  (5)
- $\text{Li}_x\text{MO}_{2-z}\text{A}_z$  (6)
- $\text{Li}_x\text{Ni}_{1-y}\text{Co}_y\text{O}_{2-z}\text{A}_z$  (7)
- $\text{Li}_x\text{Ni}_{1-y-z}\text{Co}_y\text{M}'_z\text{A}_z$  (8)
- $\text{Li}_x\text{Ni}_{1-y-z}\text{Mn}_y\text{M}'_z\text{A}_z$  (9)
- $\text{Li}_x\text{Ni}_{1-y-z}\text{Co}_y\text{M}'_z\text{O}_{2-z}\text{A}_z$  (10)
- $\text{Li}_x\text{Ni}_{1-y-z}\text{Mn}_y\text{M}'_z\text{O}_{2-z}\text{X}_z$  (11)

where

$$0.95 \leq x \leq 1.1, 0 \leq y \leq 0.5, 0 \leq z \leq 0.5, 0 \leq \alpha \leq 2,$$

M is Ni or Co.

M' is at least one element selected from the group consisting of Al, Ni, Co, Cr, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr.

M' is at least one element selected from the group consisting of Al, Cr, Mn, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr.

A is selected from the group consisting of O, F, S and P, and

X is selected from the group consisting of F, S and P.

3. The positive active material of claim 1 wherein the coating element of the coating material is soluble in organic solvents or water.

4. The positive active material of claim 3 wherein the coating element of the coating material is at least one element selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, Sn, V, Ge, Ga, B, As, Zr, and a mixture thereof.

5. The positive active material of claim 1 wherein the coating material has amorphous or crystalline form.

6. The positive active material of claim 1 wherein the surface-treatment layer has a thickness in the range of 0.1 to 300nm.

7. The positive active material of claim 6 wherein the surface-treatment layer has a thickness in the range of 0.1 to 100nm.

8. The positive active material of claim 7 wherein the surface-treatment layer has a thickness in the range of 0.1 to 50nm.

9. The positive active material of claim 1 wherein the content of the coating element of the coating material is  $2 \times 10^{-3}$  to 2 percent by weight based on the weight of the positive active material.

10. The positive active material of claim 9 wherein the content of the coating element of the coating material is 0.001 to 2 percent by weight based on the weight of the positive active material.

25. A positive active material for a rechargeable lithium battery comprising

a core comprising at least one lithiated compound; and

a surface-treatment layer on the core comprising coating element- included-hydroxide or oxyhydroxide.

26. The positive active material of claim 25 wherein the lithiated compound is at least one lithiated compound represented by formulas 1 to 11.

Art Unit: 1745



where

$$0.95 \leq x \leq 1.1, 0 \leq y \leq 0.5, 0 \leq z \leq 0.5, 0 \leq \alpha \leq 2,$$

M is Ni or Co,

M' is at least one element selected from the group consisting of Al, Ni, Co, Cr, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr, M'' is at least one element selected from the group consisting of Al, Cr, Mn, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr,

A is selected from the group consisting of O, F, S and P, and

X is selected from the group consisting of F, S and P.

27. The positive active material of claim 25 wherein the coating element of the surface treatment layer is soluble in organic solvents or water.

28. The positive active material of claim 25 wherein the coating element of the surface treatment layer is at least one element selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, Sn, V, Ge, Ga, B, As, Zr, and a mixture thereof.

29. The positive active material of claim 25 wherein the coating material has amorphous or crystalline form.

30. The positive active material of claim 25 wherein the content of the coating element of the surface-treatment layer is  $2 \times 10^{-5}$  to 2 percent by weight based on the weight of the positive active material.

31. The positive active material of claim 30 wherein the content of the coating element of the surface-treatment layer is 0.001 to 2 percent by weight based on the weight of the positive active material.

32. A positive active material for a rechargeable lithium battery comprising:

a core comprising a lithium-cobalt chalcogenide compound; and

a surface-treatment layer on the core comprising  $\text{Al}(\text{OH})_3$  or  $\text{AlO}(\text{OH})$ .

33. The positive active material of claim 32 wherein the content of Al of the surface-treatment layer is  $2 \times 10^{-5}$  to 2 percent by weight based on the weight of the positive active material.

Art Unit: 1745

34. The positive active material of claim 33 wherein the content of Al of the surface-treatment layer is 0.001 to 2 percent by weight based on the weight of the positive active material.

35. A positive active material for a rechargeable lithium battery comprising:

a core comprising a lithium-manganese or lithium-cobalt chalcogenide compound; and

a surface-treatment layer on the core comprising  $\text{HB(OH)}_2$ .

36. The positive active material of claim 35 wherein the content of B of the surface-treatment layer is  $2 \times 10^{-5}$  to 2 percent by weight based on the weight of the positive active material.

37. The positive active material of claim 36 wherein the content of B of the surface-treatment layer is 0.001 to 2 percent by weight based on the weight of the positive active material.

In this case, the application claims are broader or more generic than the copending application'445 claims, thus, the application claims are anticipated by the copending application'445 claims. Accordingly, a broad limitation/range is anticipated by a narrow limitation/range which lies within the broad limitation. *In re Goodman*. It is also noted that the specific weight percent of the additive compound is an obvious variation of the claimed invention in the copending application'445 as claims 9-10, 30-31 and 36-37 thereof specifically claims the particular weight percent.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

17. Claims 1-2, 5, 10-11 and 13 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 25-37 of copending Application No. 10/627725 (*US Patent Application Publication 2004/0018429*).

Art Unit: 1745

Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

The compending application'725 claims the following (CLAIMS 1-10 and 25-37):

1. A positive active material for a rechargeable lithium battery comprising

- a core comprising at least one lithiated compound; and
- a surface-treatment layer on the core comprising at least one coating material selected from the group consisting of coating element included-hydroxides, oxyhydroxides, oxycarbonates, hydroxycarbonates and a mixture thereof.

2. The positive active material of claim 1 wherein the lithiated compound is at least one lithiated compound represented by the formulas 1 to 11,



where

$$0.95 \leq x \leq 1.1, 0 \leq y \leq 0.5, 0 \leq z \leq 0.5, 0 \leq 60 \leq 2,$$

M is Ni or Co,

M' is at least one element selected from the group consisting of Al, Ni, Co, Cr, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr,

M'' is at least one element selected from the group consisting of Al, Cr, Mn, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr,

A is selected from the group consisting of O, F, S and P, and

X is selected from the group consisting of F, S and P.

3. The positive active material of claim 1 wherein the coating element of the coating material is soluble in organic solvents or water.

4. The positive active material of claim 3 wherein the coating element of the coating material is at least one element selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, Sn, V, Ge, Ga, B, As, Zr, and a mixture thereof.

5. The positive active material of claim 1 wherein the coating material has amorphous or crystalline form.

6. The positive active material of claim 1 wherein the surface-treatment layer has a thickness in the range of 0.1 to 300 nm.

Art Unit: 1745

7. The positive active material of claim 6 wherein the surface-treatment layer has a thickness in the range of 0.1 to 100 nm.

8. The positive active material of claim 7 wherein the surface-treatment layer has a thickness in the range of 0.1 to 50 nm.

9. The positive active material of claim 1 wherein the content of the coating element of the coating material is  $2 \times 10^{-5}$  to 2 percent by weight based on the weight of the positive active material.

10. The positive active material of claim 9 wherein the content of the coating element of the coating material is 0.001 to 2 percent by weight based on the weight of the positive active material.

25. A positive active material for a rechargeable lithium battery comprising

a core comprising at least one lithiated compound; and

a surface-treatment layer on the core comprising coating element-included-hydroxide or oxyhydroxide.

26. The positive active material of claim 25 wherein the lithiated compound is at least one lithiated compound represented by formulas 1 to 11,



where

$$0.95 \leq x \leq 1.1, 0 \leq y \leq 0.5, 0 \leq z \leq 0.5, 0 \leq \alpha \leq 2,$$

M is Ni or Co,

M' is at least one element selected from the group consisting of Al, Ni, Co, Cr, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr,

M'' is at least one element selected from the group consisting of Al, Cr, Mn, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr,

A is selected from the group consisting of O, F, S and P, and

X is selected from the group consisting of F, S and P.



Art Unit: 1745

27. The positive active material of claim 25 wherein the coating element of the surface treatment layer is soluble in organic solvents or water.

28. The positive active material of claim 25 wherein the coating element of the surface treatment layer is at least one element selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, Sn, V, Ge, Ga, B, As, Zr, and a mixture thereof.

29. The positive active material of claim 25 wherein the coating material has amorphous or crystalline form.

30. The positive active material of claim 25 wherein the content of the coating element of the surface treatment layer is  $2 \times 10^{-5}$  to 2 percent by weight based on the weight of the positive active material.

31. The positive active material of claim 30 wherein the content of the coating element of the surface treatment layer is 0.001 to 2 percent by weight based on the weight of the positive active material.

32. A positive active material for a rechargeable lithium battery comprising:

a core comprising a lithium-cobalt chalcogenide compound; and

a surface treatment layer on the core comprising  $\text{Al}(\text{OH})_3$  or  $\text{AlO}(\text{OH})$ .

33. The positive active material of claim 32 wherein the content of Al of the surface treatment layer is  $2 \times 10^{-5}$  to 2 percent by weight based on the weight of the positive active material.

34. The positive active material of claim 33 wherein the content of Al of the surface treatment layer is 0.001 to 2 percent by weight based on the weight of the positive active material.

35. A positive active material for a rechargeable lithium battery comprising:

a core comprising a lithium-manganese or lithium-cobalt chalcogenide compound; and

a surface treatment layer on the core comprising  $\text{HB}(\text{OH})_2$ .

36. The positive active material of claim 35 wherein the content of B of the surface treatment layer is  $2 \times 10^{-5}$  to 2 percent by weight based on the weight of the positive active material.

37. The positive active material of claim 36 wherein the content of B of the surface treatment layer is 0.001 to 2 percent by weight based on the weight of the positive active material.

In this case, the application claims are broader or more generic than the copending application'725 claims, thus, the application claims are anticipated by the copending application'725 claims. Accordingly, a broad limitation/range is anticipated by a narrow limitation/range which lies within the broad limitation. *In re Goodman*. It is also noted that the specific weight percent of the additive compound is an obvious variation of the claimed invention

Art Unit: 1745

*in the copending application '725 as claims 9-10, 30-31 and 36-37 thereof specifically claims the particular weight percent.*

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### ***Response to Arguments***

18. Applicant's arguments filed 08/12/05 have been considered in their entirety but they are unpersuasive.

19. (*new response*) The main contention of applicant's arguments is premised on the assertion that the primary reference "*fails to teach or suggest an amorphous additive compound*" (See amendment of 08/12/05 at page 9, 5<sup>th</sup> full paragraph) because "*Amatucci discloses using a film for coating...wherein the suitable materials for such coating film are either in a crystalline or glassy form, such as borates or aluminates (column 4, lines 9-15)*" (See amendment of 08/12/05 at page 9, 3<sup>rd</sup> full paragraph). First of all, the examiner likes to point out that applicants have admitted that the prior art of record does use glassy form materials for coating. In this regard, applicants are then respectfully requested to double check and review their assertion, and thus, re-evaluate and reconsider their position because those of ordinary skill in the art know that a glassy material (glass) stands for any of various amorphous materials formed from a melt by cooling to rigidity without crystallization (Refer to *Merriam-Webster's, Collegiate Dictionary, 10<sup>th</sup> Edition*). Thus, a glassy material does not crystallize, thereby, it does not possess a crystalline structure. Simply put, glassy materials are amorphous materials. Hence, applicant's

Art Unit: 1745

arguments with respect to the lack of an amorphous additive compound are in error and completely inapposite.

The following responses to arguments were presented in the previous office action and are herein maintained for the reasons of record.

20. Since applicants have overcome the 35 USC 102 rejection, the examiner will only address applicants' arguments concerning the 35 USC 103 rejection. In this regard, the principal contention of applicant's arguments is premised on the assertion that the prior art of record fails to reveal the specific amount (weight percent) of additive compound in the positive electrode. However, this assertion is not sufficient to overcome the rejection because the prior art (i.e. Amatucci et al'291 and the JP'813 publication) in combination does disclose the use of additive compound within the claimed range. Indeed, applicants' attention is particularly directed to EXAMPLES 1-3 in the Amatucci et al reference. Those examples clearly show using the specific claimed amount of additive compound in the positive electrode. Applicant is reminded that the test for obviousness is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Therefore, in view of the foregoing teachings, the examiner believes that it is fairly reasonable to contend that those of ordinary skill in the art would have sufficient sophistication to recognize that the specific additive compound of the JP'813 publication may be added by using exactly the same amount/percent as disclosed in Amatucci et al'291. Simply put, given that Amatucci et al'291 evidently teaches the use of an additive compound within the claimed range, the skilled artisan will only need to substitute the JP'813 publication additive in the positive

Art Unit: 1745

electrode of Amatucci et al'291. Stated somewhat differently, not because Amatucci et al'291 fail to disclose the specific additive compound (the material) per se, it means that the additive compound of the JP'813 publication cannot be added in the same manner and amount as Amatucci et al'291 instruct to add their additive compounds, that is to say, nothing in the Amatucci et al'291 reference precludes the use of other additive compounds, in particular, the additive compounds of the JP'813 publication. *Thus, in the event that applicants eventually argue that the examiner's position is improper, applicant is now advised that showing of objective evidence would be necessary to demonstrate that the use of the additive compound of the JP'813 publication, when used as taught (i.e. in the same amount/proportion) in Amatucci et al'291, would cause detrimental or deleterious damage(s) to the positive active material of Amatucci et al'291. Therefore, the burden would be shifted to the applicants to provide such objective evidence.*

21. Applicant's arguments do not comply with 37 CFR 1.111(c) because they do not clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. Further, they do not show how the amendments avoid such references or objections.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

Art Unit: 1745

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro  
Primary Examiner  
Art Unit 1745

RAYMOND ALEJANDRO  
PRIMARY EXAMINER